



SEQUENCE LISTING

<110> COLUCCI, M. GABRIELLA
CHRISPEELS, MAARTEN J.
MOORE, JEFFREY G.

<120> PROGENITOR CELL PRESERVATION FACTORS AND METHODS FOR
AND PRODUCTS OF THEIR USE

<130> PHY-003US1/108236.119US1

<140> 09/476,485

<141> 1999-12-30

<150> 08/881,189

<151> 1997-06-24

<160> 61

<170> PatentIn version 3.0

<210> 1

<211> 939

<212> DNA

<213> Artificial Sequence

<220>

<223> D1-FRIL.

<400> 1

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caaggt	cat	g	cc	act	t	ct	a	aa	ca	at	g	tt	ca	ag	t	ca	cc	ag	tt	a	ga	ca	gt	gc	ag	ga		120						
aacc	ct	gt	ga	gt	tt	ct	a	gg	ga	ag	ag	tt	ct	g	ca	cc	at	t	g	cg	cc	tt	t	gg	ga		180							
gact	ct	g	cg	g	ta	tt	ga	ca	ag	ct	tt	ga	ca	cc	at	ta	ca	ac	t	tg	aa	at	ct	c	aac	ac	ct	ta	240					
act	t	ct	c	g	ta	ta	g	ct	g	at	g	g	c	ct	t	c	tt	c	ac	ca	ct	g	ac	t	g	tc	at	ca	300					
tat	ca	tg	g	tt	g	g	t	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	360					
tct	g	aaa	a	acc	a	cc	a	cc	a	c	ta	ag	g	ct	g	ca	ta	ag	ca	ac	g	tt	g	ct	gt	tg	aa	tt	g	420				
ac	ct	at	ct	ta	at	cc	g	at	ta	tg	gt	g	at	cc	a	a	ct	ac	at	a	c	at	c	g	ga	at	tg	ac	gt	ca	480			
t	ct	at	ta	ga	ta	cc	ag	gt	aa	tg	ct	aa	gt	gg	g	act	g	g	g	g	aaa	at	g	g	g	g	aaa	at	ag	cc	act	g	ca	540
ca	ca	tt	ag	ct	ata	act	ct	gt	ct	ct	aaa	aga	ct	at	ct	gt	ta	ct	ag	tt	at	ta	tg	ct	g	g	g	g	g	ag	t		600	
aa	ac	ct	g	cg	ct	ct	ct	ct	ta	tg	at	att	g	ag	tt	ac	ata	ca	g	tg	ct	t	ct	ga	at	g	g	g	g	tc	aga		660	
g	tag	g	g	tt	at	ct	g	ct	t	ca	ac	tg	ga	ca	at	aa	ag	aa	ag	aa	at	ac	c	gt	t	ca	ct	ca	tg	gt	ct		720	
tt	ca	ct	t	t	ca	g	ct	t	g	tg	g	ac	ca	at	gt	g	g	cg	aa	ga	agg	ga	at	g	aaa	aa	ca	gt	at	att	aca		780	

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agaggcggttc tgtgatgata tatgtgtatc aatgattttc tatgttataa gcatgtaatg      840
tgcgatgagt caataatcac aagtacagtg tagtacttgt atgttgtttg tgtaagagtc      900
agtttgcttt taataataac aagtgcagtt agtacttgt                               939

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<210> 2
<211> 264
<212> PRT
<213> Artificial Sequence

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<220>
<223> D1-FRIL.

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<400> 2
Ala Gln Ser Leu Ser Phe Ser Phe Thr Lys Phe Asp Pro Asn Gln Glu
1              5              10              15

Asp Leu Ile Phe Gln Gly His Ala Thr Ser Thr Asn Asn Val Leu Gln
                20              25              30

Val Thr Lys Leu Asp Ser Ala Gly Asn Pro Val Ser Ser Ser Ala Gly
          35              40              45

Arg Val Leu Tyr Ser Ala Pro Leu Arg Leu Trp Glu Asp Ser Ala Val
          50              55              60

Leu Thr Ser Phe Asp Thr Ile Ile Asn Phe Glu Ile Ser Thr Pro Tyr
65              70              75              80

Thr Ser Arg Ile Ala Asp Gly Leu Ala Phe Phe Ile Ala Pro Pro Asp
          85              90              95

Ser Val Ile Ser Tyr His Gly Gly Phe Leu Gly Leu Phe Pro Asn Ala
          100             105             110

Asn Thr Leu Asn Asn Ser Ser Thr Ser Glu Asn Gln Thr Thr Thr Lys
          115             120             125

Ala Ala Ser Ser Asn Val Val Ala Val Glu Phe Asp Thr Tyr Leu Asn
          130             135             140

Pro Asp Tyr Gly Asp Pro Asn Tyr Ile His Ile Gly Ile Asp Val Asn
          145             150             155             160

Ser Ile Arg Ser Lys Val Thr Ala Lys Trp Asp Trp Gln Asn Gly Lys
          165             170             175

Ile Ala Thr Ala His Ile Ser Tyr Asn Ser Val Ser Lys Arg Leu Ser
          180             185             190

Val Thr Ser Tyr Tyr Ala Gly Ser Lys Pro Ala Thr Leu Ser Tyr Asp
          195             200             205

Ile Glu Leu His Thr Val Leu Pro Glu Trp Val Arg Val Gly Leu Ser
          210             215             220

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Ala Ser Thr Gly Gln Asp Lys Glu Arg Asn Thr Val His Ser Trp Ser
 225 230 235 240

Phe Thr Ser Ser Leu Trp Thr Asn Val Ala Lys Lys Glu Asn Glu Asn
 245 250 255

Lys Tyr Ile Thr Arg Gly Val Leu
 260

<210> 3

<211> 1005

<212> DNA

<213> Artificial Sequence

<220>

<223> Nucleic acid sequence of the naturally-occurring
 D1-FRIL protein.

<400> 3

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atggcttcct ccaacttact caccctagcc ctcttccttg tgcttctcac ccacgcaaac      60
tcagccgcac agtcattgtc atttagtttc accaagtttg atcctaacca agaggatctt      120
atcttccaag gtcatgccac ttctacaaac aatgtcttac aagtcaccaa gtagacagt      180
gcaggaaacc ctgtgagttc tagtgcgga agagtgttat attctgcacc attgcgcctt      240
tggaagact ctgcggtatt gacaagcttt gacaccatta tcaactttga aatctcaaca      300
ccttacactt ctcgatatgc tgatggcttg gccttcttca ttgcaccacc tgactctgtc      360
atcagttatc atggtggttt tcttggactc tttcccaacg caaacactct caacaactct      420
tcacactctg aaaaccaaac caccactaag gctgcatcaa gcaacgttgt tgctgttgaa      480
tttgacacct atcttaatcc cgattatggt gatccaaact acatacacat cggaattgac      540
gtcaactcta ttagatccaa ggtaactgct aagtgggact ggcaaaatgg gaaaatagcc      600
actgcacaca ttagctataa ctctgtctct aaaagactat ctgttactag ttattatgct      660
gggagtaaac ctgcgactct ctctatgat attgagttac atacagtgtc tcctgaatgg      720
gtcagagtag ggttatctgc ttcaactgga caagataaag aaagaaatac cgttcactca      780
tggctcttca cttcaagctt gtggaccaat gtggcgaaga aggagaatga aaacaagtat      840
attacaagag gcgttctgtg atgatatatg tgtatcaatg attttctatg ttataagcat      900
gtaatgtgag atgagtcaat aatcacaagt acagtgtagt acttgatatg tgtttgtgta      960
agagtcagtt tgcttttaat aataacaagt gcagttagta cttgt                                1005

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<210> 4

<211> 22

<212> PRT

<213> Artificial Sequence

<220>

<223> Signal sequence from the FRIL family isolated from
Dolichos lab lab

<400> 4

Met Ala Ser Ser Asn Leu Leu Thr Leu Ala Leu Phe Leu Val Leu Leu
1 5 10 15

Thr His Ala Asn Ser Ala
 20

<210> 5

<211> 914

<212> DNA

<213> Artificial Sequence

<220>

<223> Pv-FRIL.

<400> 5

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aaccctgtgg	gtgctagtgt	gggaagagt	ttattctctg	caccatttca	tctttgggaa	180	
aactctatgg	cagtgtcaag	ctttgaaact	aatctcacca	ttcaaactc	aacacctcac	240	
ccttattatg	cagctgatgg	ctttgccttc	ttccttgac	cacatgacac	tgatcatccct	300	
ccaaattctt	ggggcaaatt	ccttggaact	tactcaaacg	ttttcagaaa	ctccccacc	360	
tctgaaaacc	aaagctttgg	tgatgtcaat	actgactcaa	gagttgttgc	tgatgaattt	420	
gacaccttcc	ctaagccaa	tattgatcca	aattacagac	acattggaat	cgatgtgaac	480	
tctattaagt	ccaaggaaac	tgctaggtgg	gagtggaaca	atgggaaaac	ggccactgca	540	
cgcacagct	ataactctgc	ctctaaaaaa	tcaactgtta	ctacgtttta	tcctgggatg	600	
gaagttgtgg	ctctctccca	tgatgttgac	ttacatgcag	agcttctctga	atgggttaga	660	
gtagggttat	ctgcttcaac	tgagaggag	aaacaaaaaa	ataccattat	ctcatggtct	720	
ttcacttcaa	gcttgaagaa	caacgaggtg	aaggagccga	aagaagacat	gtatattgca	780	
aacgttgtgc	gatcatatac	atggatcaat	gacgttctat	cttatataag	caataaataa	840	
atgtatgatg	cactcaataa	taatcacaag	tacgtacggg	gtagtacttg	tatgttgttt	900	
atgaaaaaaa	aaaa					914	

<210> 6
 <211> 279
 <212> PRT
 <213> Artificial Sequence

<220>
 <223> Pv-FRIL.

<400> 6
 Ala Gln Ser Leu Ser Phe Asn Phe Thr Lys Phe Asp Leu Asp Gln Lys
 1 5 10 15
 Asp Leu Ile Phe Gln Gly Asp Ala Thr Ser Thr Asn Asn Val Leu Gln
 20 25 30
 Leu Thr Lys Leu Asp Ser Gly Gly Asn Pro Val Gly Ala Ser Val Gly
 35 40 45
 Arg Val Leu Phe Ser Ala Pro Phe His Leu Trp Glu Asn Ser Met Ala
 50 55 60
 Val Ser Ser Phe Glu Thr Asn Leu Thr Ile Gln Ile Ser Thr Pro His
 65 70 75 80
 Pro Tyr Tyr Ala Ala Asp Gly Phe Ala Phe Phe Leu Ala Pro His Asp
 85 90 95
 Thr Val Ile Pro Pro Asn Ser Trp Gly Lys Phe Leu Gly Leu Tyr Ser
 100 105 110
 Asn Val Phe Arg Asn Ser Pro Thr Ser Glu Asn Gln Ser Phe Gly Asp
 115 120 125
 Val Asn Thr Asp Ser Arg Val Val Ala Val Glu Phe Asp Thr Phe Pro
 130 135 140
 Asn Ala Asn Ile Asp Pro Asn Tyr Arg His Ile Gly Ile Asp Val Asn
 145 150 155 160
 Ser Ile Lys Ser Lys Glu Thr Ala Arg Trp Glu Trp Gln Asn Gly Lys
 165 170 175
 Thr Ala Thr Ala Arg Ile Ser Tyr Asn Ser Ala Ser Lys Lys Ser Thr
 180 185 190
 Val Thr Thr Phe Tyr Pro Gly Met Glu Val Val Ala Leu Ser His Asp
 195 200 205
 Val Asp Leu His Ala Glu Leu Pro Glu Trp Val Arg Val Gly Leu Ser
 210 215 220
 Ala Ser Thr Gly Glu Glu Lys Gln Lys Asn Thr Ile Ile Ser Trp Ser
 225 230 235 240
 Phe Thr Ser Ser Leu Lys Asn Asn Glu Val Lys Glu Pro Lys Glu Asp
 245 250 255

Met Tyr Ile Ala Asn Val Val Arg Ser Tyr Thr Trp Ile Asn Asp Val
 260 265 270

Leu Ser Tyr Ile Ser Asn Lys
 275

<210> 7

<211> 678

<212> DNA

<213> Artificial Sequence

<220>

<223> YamFril partial mRNA sequence.

<400> 7

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acgaagttcg acagcgacca aaaggatctt atgttccaag gtcataccat ttctagcagc      60
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agagtgttat actctgcacc attgcgcctt tgggaaagct ctacagtagt gtcaaccttt      180
gagaccactt tcacctttca aatctcaaca ccttacacta gtcctcctgg tgatgggctc      240
gccttcttcc ttgcaccata tgacactgtc atccctccaa attctgctgg caatcttctt      300
ggactctttc ctaacttaaa tgctttaaga aactccacca ccagtaaaga aaccactatt      360
gatgtcaatg ctgcatctaa caacgttggt gccgttgaat ttgacaccta ccctaacgac      420
aatattgggtg atccaagata caaacacatt ggaatcgatg tcaactctat caggtccaag      480
gcaactgttg cgtgggactg gcaaaatggg aaaacagcca ctgcacacat cagctataac      540
tctgcctcta aaagactatc tgttactact ttttatcctg ggggtaaagc tgtgagtctt      600
tcccatgacg ttgagctcac tcaagtgctt cctcaatgga ttagagtagg gttctctgct      660
tcaacaggat tagagaaa                                     678
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<210> 8

<211> 234

<212> PRT

<213> Artificial Sequence

<220>

<223> YamFril deduced amino acid squence.

<400> 8

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Ala Gln Ser Val Ser Phe Thr Phe Thr Lys Phe Asp Ser Asp Gln Lys
1           5           10          15

Asp Leu Met Phe Gln Gly His Thr Ile Ser Ser Ser Asn Val Ile Gln
20          25          30

Leu Thr Lys Leu Asp Ser Asn Gly Asn Pro Val Ser Thr Ser Val Gly
35          40          45
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Arg Val Leu Tyr Ser Ala Pro Leu Arg Leu Trp Glu Ser Ser Thr Val
 50 55 60
 Val Ser Thr Phe Glu Thr Thr Phe Thr Phe Gln Ile Ser Thr Pro Tyr
 65 70 75 80
 Thr Ser Pro Pro Gly Asp Gly Leu Ala Phe Phe Leu Ala Pro Tyr Asp
 85 90 95
 Thr Val Ile Pro Pro Asn Ser Ala Gly Asn Leu Leu Gly Leu Phe Pro
 100 105 110
 Asn Leu Asn Ala Leu Arg Asn Ser Thr Thr Ser Lys Glu Thr Thr Ile
 115 120 125
 Asp Val Asn Ala Ala Ser Asn Asn Val Val Ala Val Glu Phe Asp Thr
 130 135 140
 Tyr Pro Asn Asp Asn Ile Gly Asp Pro Arg Tyr Lys His Ile Gly Ile
 145 150 155 160
 Asp Val Asn Ser Ile Arg Ser Lys Ala Thr Val Ala Trp Asp Trp Gln
 165 170 175
 Asn Gly Lys Thr Ala Thr Ala His Ile Ser Tyr Asn Ser Ala Ser Lys
 180 185 190
 Arg Leu Ser Val Thr Thr Phe Tyr Pro Gly Gly Lys Ala Val Ser Leu
 195 200 205
 Ser His Asp Val Glu Leu Thr Gln Val Leu Pro Gln Trp Ile Arg Val
 210 215 220
 Gly Phe Ser Ala Ser Thr Gly Leu Glu Lys
 225 230

<210> 9
 <211> 15
 <212> PRT
 <213> Artificial Sequence

<220>
 <223> Beta band polypeptide.

<400> 9
 Ala Gln Ser Val Ser Phe Thr Phe Thr Lys Phe Asp Ser Asp Gln
 1 5 10 15

<210> 10
 <211> 16
 <212> PRT
 <213> Artificial Sequence

<220>
 <223> Alpha band polypeptide.

<220>
 <221> MOD_RES
 <222> (14)
 <223> any amino acid.

<400> 10
 Ala Ala Ser Asn Asn Val Val Ala Val Glu Phe Asp Thr Xaa Pro Asn
 1 5 10 15

<210> 11
 <211> 23
 <212> DNA
 <213> Artificial Sequence

<220>
 <223> MLA degenerate oligonucleotide primer.

<220>
 <221> misc_feature
 <222> (3)
 <223> a or g.

<220>
 <221> misc_feature
 <222> (6)
 <223> t or c.

<220>
 <221> misc_feature
 <222> (9)
 <223> t or c.

<220>
 <221> misc_feature
 <222> (12)
 <223> a or t.

<220>
 <221> misc_feature
 <222> (15)
 <223> t or c.

<220>
 <221> misc_feature
 <222> (18)
 <223> a or g.

<220>
 <221> misc_feature
 <222> (21)
 <223> a or g.

<400> 11
 aantnganc cnaancanga nga

<210> 12
 <211> 20
 <212> DNA
 <213> Artificial Sequence

<220>
 <223> MLZ degenerate oligonucleotide primer.

<220>
 <221> misc_feature
 <222> (3)
 <223> a or t.

<220>
 <221> misc_feature
 <222> (6)
 <223> a or g.

<220>
 <221> misc_feature
 <222> (9)
 <223> t or c.

<220>
 <221> misc_feature
 <222> (15)
 <223> a or g.

<400> 12
 ttncctttnt gccantccca

20

<210> 13
 <211> 15
 <212> DNA
 <213> Artificial Sequence

<220>
 <223> primer.

<400> 13
 gtaccgagct cggat

15

<210> 14
 <211> 18
 <212> DNA
 <213> Artificial Sequence

<220>
 <223> primer.

<400> 14
 tctagatgca tgctcgag

18

<210> 15
 <211> 22
 <212> DNA
 <213> Artificial Sequence

<220>
 <223> MLX primer.

<400> 15
 gttggacgctc aattccgatg tg

22

<210> 16
 <211> 17
 <212> DNA
 <213> Artificial Sequence

<220>
 <223> MLI degenerate primer.

<220>
 <221> misc_feature
 <222> (3)
 <223> t or c.

<220>
 <221> misc_feature
 <222> (6)
 <223> a or g.

<220>
 <221> misc_feature
 <222> (9)
 <223> t or c.

<220>
 <221> misc_feature
 <222> (12)
 <223> t or c.

<220>
 <221> misc_feature
 <222> (15)
 <223> t or c.

<400> 16
 gcncantcnc tntcntt

17

<210> 17
 <211> 22
 <212> DNA
 <213> Artificial Sequence

<220>
 <223> Oligo(dT) anchor primer.

<400> 17
gaccacgcgt atcgatgtcg ac

22

<210> 18
<211> 21
<212> DNA
<213> Artificial Sequence

<220>
<223> MLB primer.

<400> 18
aagttagaca gtgcaggaaa c

21

<210> 19
<211> 20
<212> DNA
<213> Artificial Sequence

<220>
<223> MLII primer.

<400> 19
gcacagtcac tgtcatttag

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<210> 20
<211> 18
<212> PRT
<213> Artificial Sequence

<220>
<223> D1-FRIL.

<400> 20
Tyr Leu Asn Pro Asp Tyr Gly Asp Pro Asn Tyr Ile His Ile Gly Ile
1 5 10 15

Asp Val

<210> 21
<211> 19
<212> PRT
<213> Artificial Sequence

<220>
<223> Pea.

<400> 21
Phe Tyr Asn Ala Ala Trp Asp Pro Ser Asn Arg Asp Arg His Ile Gly
1 5 10 15

Ile Asp Val

<210> 22
 <211> 1005
 <212> DNA
 <213> Artificial Sequence

<220>
 <223> SpDLA.

<400> 22
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 atcttccaag gtcatgccac ttctacaaac aatgtcttac aagtcaccaa gttagacagt 180
 gcaggaaacc ctgtgagttc tagtgcgga agagtgttat attctgcacc attgcgcctt 240
 tgggaagact ctgcggtatt gacaagcttt gacaccatta tcaactttga aatctcaaca 300
 ccttacactt ctcgatatgc tgatggcttg gccttcttca ttgcaccacc tgactctgtc 360
 atcagttatc atgggtggtt tcttggaactc tttcccaacg caaacactct caacaactct 420
 tccacctctg aaaaccaaac caccactaag gctgcatcaa gcaacgttgt tgctgttgaa 480
 tttgacacct atcttaatcc cgattatggg gatccaaact acatacacat cggaattgac 540
 gtcaactcta ttagatccaa ggtaactgct aagtgggact ggcaaaatgg gaaaatagcc 600
 actgcacaca ttagctataa ctctgtctct aaaagactat ctgttactag ttattatgct 660
 gggagtaaac ctgcgactct ctccatgat attgagttac atacagtgtc tcctgaatgg 720
 gtcagagtag ggttatctgc ttcaactgga caagataaag aaagaaatac cgttcactca 780
 tgggtctttca cttcaagctt gtggaccaat gtggcggaaga aggagaatga aaacaagtat 840
 attacaagag gcgttctgtg atgatatatg tgtatcaatg attttctatg ttataagcat 900
 gtaatgtgcg atgagtcaat aatcacaagt acagtgtagt acttgatatg tgtttgtgta 960
 agagtcagtt tgcttttaat aataacaagt gcagttagta cttgt 1005

<210> 23
 <211> 286
 <212> PRT
 <213> Artificial Sequence

<220>
 <223> SpDLA.

<400> 23
 Met Ala Ser Ser Asn Leu Leu Thr Leu Ala Leu Phe Leu Val Leu Leu
 1 5 10 15

Thr	His	Ala	Asn	Ser	Ala	Ala	Gln	Ser	Leu	Ser	Phe	Ser	Phe	Thr	Lys
			20					25					30		
Phe	Asp	Pro	Asn	Gln	Glu	Asp	Leu	Ile	Phe	Gln	Gly	His	Ala	Thr	Ser
		35					40					45			
Thr	Asn	Asn	Val	Leu	Gln	Val	Thr	Lys	Leu	Asp	Ser	Ala	Gly	Asn	Pro
	50					55					60				
Val	Ser	Ser	Ser	Ala	Gly	Arg	Val	Leu	Tyr	Ser	Ala	Pro	Leu	Arg	Leu
65					70					75					80
Trp	Glu	Asp	Ser	Ala	Val	Leu	Thr	Ser	Phe	Asp	Thr	Ile	Ile	Asn	Phe
				85					90					95	
Glu	Ile	Ser	Thr	Pro	Tyr	Thr	Ser	Arg	Ile	Ala	Asp	Gly	Leu	Ala	Phe
			100					105					110		
Phe	Ile	Ala	Pro	Pro	Asp	Ser	Val	Ile	Ser	Tyr	His	Gly	Gly	Phe	Leu
		115					120					125			
Gly	Leu	Phe	Pro	Asn	Ala	Asn	Thr	Leu	Asn	Asn	Ser	Ser	Thr	Ser	Glu
	130					135					140				
Asn	Gln	Thr	Thr	Thr	Lys	Ala	Ala	Ser	Ser	Asn	Val	Val	Ala	Val	Glu
145					150					155					160
Phe	Asp	Thr	Tyr	Leu	Asn	Pro	Asp	Tyr	Gly	Asp	Pro	Asn	Tyr	Ile	His
				165					170					175	
Ile	Gly	Ile	Asp	Val	Asn	Ser	Ile	Arg	Ser	Lys	Val	Thr	Ala	Lys	Trp
			180					185					190		
Asp	Trp	Gln	Asn	Gly	Lys	Ile	Ala	Thr	Ala	His	Ile	Ser	Tyr	Asn	Ser
		195					200					205			
Val	Ser	Lys	Arg	Leu	Ser	Val	Thr	Ser	Tyr	Tyr	Ala	Gly	Ser	Lys	Pro
	210					215					220				
Ala	Thr	Leu	Ser	Tyr	Asp	Ile	Glu	Leu	His	Thr	Val	Leu	Pro	Glu	Trp
225					230					235					240
Val	Arg	Val	Gly	Leu	Ser	Ala	Ser	Thr	Gly	Gln	Asp	Lys	Glu	Arg	Asn
				245					250					255	
Thr	Val	His	Ser	Trp	Ser	Phe	Thr	Ser	Ser	Leu	Trp	Thr	Asn	Val	Ala
			260					265					270		
Lys	Lys	Glu	Asn	Glu	Asn	Lys	Tyr	Ile	Thr	Arg	Gly	Val	Leu		
		275					280					285			

<210> 24

<211> 8

<212> PRT

<213> Dolichos lablab

<220>
 <221> MOD_RES
 <222> (7)
 <223> any amino acid.

<400> 24
 Thr Asn Asn Val Leu Gln Xaa Thr
 1 5

<210> 25
 <211> 24
 <212> DNA
 <213> Artificial Sequence

<220>
 <223> MutI primer.

<400> 25
 ccataatcgg gatcaagata ggtg

24

<210> 26
 <211> 24
 <212> DNA
 <213> Artificial Sequence

<220>
 <223> MutII primer.

<400> 26
 cacctatctt gatcccgatt atgg

24

<210> 27
 <211> 24
 <212> DNA
 <213> Artificial Sequence

<220>
 <223> M1 Forw primer.

<400> 27
 aactcagccg cacagtcatt gtca

24

<210> 28
 <211> 28
 <212> DNA
 <213> Artificial Sequence

<220>
 <223> APEcoRI primer.

<400> 28
 gaattcgacc acgcgtatcg atgtcgac

28

<210> 29
 <211> 21
 <212> DNA
 <213> Artificial Sequence

<220>
 <223> Sigforw primer.

<400> 29
 gaattcatgg cttcctccaa c

21

<210> 30
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 <212> DNA
 <213> Artificial Sequence

<220>
 <223> Sigrev primer.

<400> 30
 tgactgtgcg gctgagtttg cgtgggtg

28

<210> 31
 <211> 14
 <212> PRT
 <213> Artificial Sequence

<220>
 <223> Peptide corresponding to Pv-FRIL.

<220>
 <221> PEPTIDE
 <222> (7)
 <223> Asn, Cys, or Ser

<400> 31
 Ala Gln Ser Leu Ser Phe Xaa Phe Thr Lys Phe Asp Leu Asp
 1 5 10

<210> 32
 <211> 14
 <212> PRT
 <213> Artificial Sequence

<220>
 <223> Polypeptide of 18 kDa.

<220>
 <221> PEPTIDE
 <222> (7)
 <223> unknown amino acid.

<400> 32

Ala Gln Ser Leu Ser Phe Xaa Phe Thr Lys Asp Ala Leu Asp
 1 5 10

<210> 33

<211> 14

<212> PRT

<213> Artificial Sequence

<220>

<223> Aminoterminal sequence.

<220>

<221> PEPTIDE

<222> (12>

<223> unknown amino acid.

<400> 33

Thr Asp Ser Arg Val Val Ala Val Glu Phe Asp Xaa Phe Pro
 1 5 10

<210> 34

<211> 13

<212> PRT

<213> Artificial Sequence

<220>

<223> Aminoterminal polypeptide.

<220>

<221> PEPTIDE

<222> (7)

<223> unknown amino acid.

<400> 34

Ala Gln Ser Leu Ser Phe Xaa Phe Lys Phe Asp Pro Asn
 1 5 10

<210> 35

<211> 11

<212> PRT

<213> Artificial Sequence

<220>

<223> Aminoterminal polypeptide.

<400> 35

Thr Asp Ser Arg Val Val Ala Val Glu Asp Phe
 1 5 10

<210> 36

<211> 20

<212> DNA
 <213> Artificial Sequence

<220>
 <223> Degenerate oligonucleotide PVBeta1.

<220>
 <221> misc_feature
 <222> (18)
 <223> any nucleotide.

<400> 36
 ttyacyaart tygayytnga

20

<210> 37
 <211> 17
 <212> DNA
 <213> Artificial Sequence

<220>
 <223> Degenerate oligonucleotide PVBeta2.

<400> 37
 atyttycarg gwgaygc

17

<210> 38
 <211> 20
 <212> DNA
 <213> Artificial Sequence

<220>
 <223> Degenerate oligonucleotide PVAlfa1.

<400> 38
 ttracrtrcra twccratrtg

20

<210> 39
 <211> 23
 <212> DNA
 <213> Artificial Sequence

<220>
 <223> Degenerate oligonucleotide PVAlfa2.

<400> 39
 tarttwggrrt cratrtttrgc rtt

23

<210> 40
 <211> 22
 <212> DNA
 <213> Artificial Sequence

<220>
 <223> PV3 PCR-Anchor primer.

<400> 40
 caatgtctta caactcacta ag 22

<210> 41
 <211> 21
 <212> DNA
 <213> Artificial Sequence

<220>
 <223> PV4 PCR-Anchor primer.

<400> 41
 agtgtgggaa gagtgttatt c 21

<210> 42
 <211> 21
 <212> DNA
 <213> Artificial Sequence

<220>
 <223> SPV2 Anchor primer.

<400> 42
 accaaagctt tggttttcag a 21

<210> 43
 <211> 21
 <212> DNA
 <213> Artificial Sequence

<220>
 <223> SPV3 Anchor primer.

<400> 43
 tctgaaaacg tttgagtaga g 21

<210> 44
 <211> 32
 <212> DNA
 <213> Artificial Sequence

<220>
 <223> PVEcoRI primer.

<400> 44
 tacatgaatt cgctcagtca ttatctttta ac 32

<210> 45
 <211> 21
 <212> DNA
 <213> Artificial Sequence

<220>

<223> Sigfor BglIII primer.

<400> 45

agatctatgg cttcctccaa c

21

<210> 46

<211> 32

<212> DNA

<213> Artificial Sequence

<220>

<223> Sigrev primer.

<400> 46

aaagataatg actgagcggc tgagtttgcg tg

32

<210> 47

<211> 32

<212> DNA

<213> Artificial Sequence

<220>

<223> SpMlforw primer.

<400> 47

cacgcaaact cagccgctca gtcattatct tt

32

<210> 48

<211> 27

<212> DNA

<213> Artificial Sequence

<220>

<223> APXhoI primer.

<400> 48

ctcgaggacc acgcgtatcg atgtcga

27

<210> 49

<211> 105

<212> PRT

<213> Artificial Sequence

<220>

<223> Beta-subunit of the mannose lectin of Gowda et al.

<400> 49

Ala	Gln	Ser	Leu	Ser	Phe	Ser	Phe	Thr	Lys	Phe	Asp	Pro	Asn	Gln
1				5					10					15

Glu	Asp	Leu	Ile	Phe	Gln	Gly	Thr	Ala	Thr	Ser	Lys	Leu	Asp	Ser	Ala
				20					25					30	

Gly Asn Pro Val Ser Ser Ser Ala Gly Arg Val Leu Tyr Ser Ala Pro
 35 40 45
 Leu Arg Leu Trp Glu Asp Ser Ala Val Leu Thr Ser Phe Asp Pro Thr
 50 55 60
 Ile Tyr Ile Phe Thr Asn Tyr Thr Ser Arg Ile Ala Asp Gly Leu Ala
 65 70 75
 Phe Ile Ala Pro Pro Asp Ser Val Ile Ser Tyr His Gly Gly Phe Leu
 80 85 90 95
 Gly Leu Phe Pro Asn Ala Ala Glu Ser Gly
 100 105

<210> 50

<211> 123

<212> PRT

<213> Artificial Sequence

<220>

<223> Beta-subunit of D1-FRIL.

<400> 50

Ala Gln Ser Leu Ser Phe Ser Phe Thr Lys Phe Asp Pro Asn Gln Glu
 1 5 10 15
 Asp Leu Ile Phe Gln Gly His Ala Thr Ser Thr Asn Asn Val Leu Gln
 20 25 30
 Val Thr Lys Leu Asp Ser Ala Gly Asn Pro Val Ser Ser Ser Ala Gly
 35 40 45
 Arg Val Leu Tyr Ser Ala Pro Leu Arg Leu Trp Glu Asp Ser Ala Val
 50 55 60
 Leu Thr Ser Phe Asp Thr Ile Ile Asn Phe Glu Ile Ser Thr Pro Tyr
 65 70 75 80
 Thr Ser Arg Ile Ala Asp Gly Leu Ala Phe Phe Ile Ala Pro Pro Asp
 85 90 95
 Ser Val Ile Ser Tyr His Gly Gly Phe Leu Gly Leu Phe Pro Asn Ala
 100 105 110
 Asn Thr Leu Asn Asn Ser Ser Thr Ser Glu Asn
 115 120

<210> 51

<211> 132

<212> PRT

<213> Artificial Sequence

<220>

<223> Alpha-subunit of the mannose lectin of Gowda et al.

<400> 51

Ile Ala Glu Ser Asn Val Val Ala Val Glu Phe Asp Thr Asp Tyr Leu
 1 5 10 15

Asn Pro Asp Tyr Gly Asp Pro Asn Tyr Ile His Ile Gly Ile Asp Val
 20 25 30

Asn Ser Ile Arg Ser Lys Val Thr Ala Ser Trp Asp Trp Gln Asn Gly
 35 40 45

Lys Ile Ala Thr Ala His Ile Ser Tyr Asn Ser Val Ser Lys Arg Leu
 50 55 60

Ser Val Thr Thr Tyr Tyr Pro Gly Arg Gly Lys Pro Ala Thr Ser Tyr
 65 70 75 80

Asp Ile Glu Leu His Thr Val Leu Pro Glu Trp Val Arg Val Gly Leu
 85 90 95

Ser Ala Ser Thr Gly Gln Asn Ile Glu Arg Asn Thr Val His Ser Trp
 100 105 110

Ser Phe Thr Ser Ser Leu Trp Thr Asn Val Ala Lys Val Gly Val Ala
 115 120 125

Ser Ile Ser Gly
 130

<210> 52

<211> 141

<212> PRT

<213> Artificial Sequence

<220>

<223> Alpha-subunit of D1-FRIL.

<400> 52

Gln Thr Thr Thr Lys Ala Ala Ser Ser Asn Val Val Ala Val Glu Phe
 1 5 10 15

Asp Thr Tyr Leu Asn Pro Asp Tyr Gly Asp Pro Asn Tyr Ile His Ile
 20 25 30

Gly Ile Asp Val Asn Ser Ile Arg Ser Lys Val Thr Ala Lys Trp Asp
 35 40 45

Trp Gln Asn Gly Lys Ile Ala Thr Ala His Ile Ser Tyr Asn Ser Val
 50 55 60

Ser Lys Arg Leu Ser Val Thr Ser Tyr Tyr Ala Gly Ser Lys Pro Ala
 65 70 75 80

Thr Leu Ser Tyr Asp Ile Glu Leu His Thr Val Leu Pro Glu Trp Val
 85 90 95

Arg Val Gly Leu Ser Ala Ser Thr Gly Gln Asp Lys Glu Arg Asn Thr
 100 105 110

Val His Ser Trp Ser Phe Thr Ser Ser Leu Trp Thr Asn Val Ala Lys
 115 120 125

Lys Glu Asn Glu Asn Lys Tyr Ile Thr Arg Gly Val Leu
 130 135 140

<210> 53

<211> 64

<212> DNA

<213> Artificial Sequence

<220>

<223> Recombinant expression vector.

<400> 53

ctgggtccgc gtggatcccc ggaattcatg cccgggttcga ctcgagcggc cgcattcgtga 60

ctga 64

<210> 54

<211> 54

<212> DNA

<213> Artificial Sequence

<220>

<223> Recombinant expression vector.

<400> 54

ctgggtccgc gtggatcccc ggaattcatg ctcgagcggc cgcattcgtga ctga 54

<210> 55

<211> 237

<212> PRT

<213> Artificial Sequence

<220>

<223> Mannose lectin of Gowda et al.

<400> 55

Ala Gln Ser Leu Ser Phe Ser Phe Thr Lys Phe Asp Pro Asn Gln Glu
 1 5 10 15

Asp Leu Ile Phe Gln Gly Thr Ala Thr Ser Lys Leu Asp Ser Ala Gly
 20 25 30

Asn Pro Val Ser Ser Ser Ala Gly Arg Val Leu Tyr Ser Ala Pro Leu
 35 40 45

Arg Leu Trp Glu Asp Ser Ala Val Leu Thr Ser Phe Asp Pro Thr Ile
 50 55 60

Tyr Ile Phe Thr Asn Tyr Thr Ser Arg Ile Ala Asp Gly Leu Ala Phe
 65 70 75 80

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<210> 56
<211> 279
<212> PRT
<213> Artificial Sequence
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<220>
<223> PvFRIL.

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<400> 56
Ala Gln Ser Leu Ser Phe Asn Phe Thr Lys Phe Asp Leu Asp Gln Lys
1          5          10          15
Asp Leu Ile Phe Gln Gly Asp Ala Thr Ser Thr Asn Asn Val Leu Gln
20          25          30
Leu Thr Lys Leu Asp Ser Gly Gly Asn Pro Val Gly Ala Ser Val Gly
35          40          45
Arg Val Leu Phe Ser Ala Pro Phe His Leu Trp Glu Asn Ser Met Ala
50          55          60
Val Ser Ser Phe Glu Thr Asn Leu Thr Ile Gln Ile Ser Thr Pro His
65          70          75          80
Pro Tyr Tyr Ala Ala Asp Gly Phe Ala Phe Phe Leu Ala Pro His Asp
85          90          95

```

Thr Val Ile Pro Pro Asn Ser Trp Gly Lys Phe Leu Gly Leu Tyr Ser
 100 105 110
 Asn Val Phe Arg Asn Ser Pro Thr Ser Glu Asn Gln Ser Phe Gly Asp
 115 120 125
 Val Asn Thr Asp Ser Arg Val Val Ala Val Glu Phe Asp Thr Phe Pro
 130 135 140
 Asn Ala Asn Ile Asp Pro Asn Tyr Arg His Ile Gly Ile Asp Val Asn
 145 150 155 160
 Ser Ile Lys Ser Lys Glu Thr Ala Arg Trp Glu Trp Gln Asn Gly Lys
 165 170 175
 Thr Ala Thr Ala Arg Ile Ser Tyr Asn Ser Ala Ser Lys Lys Ser Thr
 180 185 190
 Val Thr Thr Phe Tyr Pro Gly Met Glu Val Val Ala Leu Ser His Asp
 195 200 205
 Val Asp Leu His Ala Glu Leu Pro Glu Trp Val Arg Val Gly Leu Ser
 210 215 220
 Ala Ser Thr Gly Glu Glu Lys Gln Lys Asn Thr Ile Ile Ser Trp Ser
 225 230 235 240
 Phe Thr Ser Ser Leu Lys Asn Asn Glu Val Lys Glu Pro Lys Glu Asp
 245 250 255
 Met Tyr Ile Ala Asn Val Val Arg Ser Tyr Thr Trp Ile Asn Asp Val
 260 265 270
 Leu Ser Tyr Ile Ser Asn Lys
 275

<210> 57
 <211> 254
 <212> PRT
 <213> Artificial Sequence

<220>
 <223> PHA-E.

<400> 57
 Ala Ser Gln Thr Ser Phe Ser Phe Gln Arg Phe Asn Glu Thr Asn Leu
 1 5 10 15
 Ile Leu Gln Arg Asp Ala Thr Val Ser Ser Lys Gly Gln Leu Arg Leu
 20 25 30
 Thr Asn Val Asn Asp Asn Gly Glu Pro Thr Leu Ser Ser Leu Gly Arg
 35 40 45
 Ala Phe Tyr Ser Ala Pro Ile Gln Ile Trp Asp Asn Thr Thr Gly Ala
 50 55 60

25

Val	Ala	Ala	Ser	Pro	Thr	Ser	Phe	Thr	Phe	Asn	Ile	Asp	Val	Pro	Asn	
65					70				75						80	
Asn	Ser	Gly	Pro	Ala	Asp	Gly	Leu	Ala	Phe	Val	Leu	Leu	Pro	Val	Gly	
			85						90					95		
Ser	Gln	Pro	Lys	Asp	Lys	Gly	Gly	Leu	Leu	Gly	Leu	Phe	Asn	Asn	Tyr	
		100						105					110			
Lys	Tyr	Asp	Ser	Asn	Ala	His	Thr	Val	Ala	Val	Glu	Phe	Asp	Thr	Leu	
	115						120					125				
Tyr	Asn	Val	His	Trp	Asp	Pro	Lys	Pro	Arg	His	Ile	Gly	Ile	Asp	Val	
	130					135					140					
Asn	Ser	Ile	Lys	Ser	Ile	Lys	Thr	Thr	Thr	Trp	Asp	Phe	Val	Lys	Gly	
145					150					155					160	
Glu	Asn	Ala	Glu	Val	Leu	Ile	Thr	Tyr	Asp	Ser	Ser	Thr	Lys	Leu	Leu	
			165						170					175		
Val	Ala	Ser	Leu	Val	Tyr	Pro	Ser	Leu	Lys	Thr	Ser	Phe	Ile	Val	Ser	
		180						185					190			
Asp	Thr	Val	Asp	Leu	Lys	Ser	Val	Leu	Pro	Glu	Trp	Val	Ile	Val	Gly	
	195						200					205				
Phe	Thr	Ala	Thr	Thr	Gly	Ile	Thr	Lys	Gly	Asn	Val	Glu	Thr	Asn	Asp	
	210					215					220					
Ile	Leu	Ser	Trp	Ser	Phe	Ala	Ser	Lys	Leu	Ser	Asp	Gly	Thr	Thr	Ser	
225					230					235					240	
Glu	Ala	Leu	Asn	Leu	Ala	Asn	Phe	Ala	Leu	Asn	Gln	Ile	Leu			
			245						250							

<210> 58
 <211> 20
 <212> PRT
 <213> Artificial Sequence

<220>
 <223> Synthetic Peptide

<220>
 <221> MOD_RES
 <222> (7)
 <223> Variable Amino Acid

<400> 58
 Asp Ser Ser Thr Ser Glu Xaa Gln Thr Thr Thr Lys Ala Ala Ser Ser
 1 5 10 15

Asn Val Val Ala
 20

<210> 59
 <211> 13
 <212> PRT
 <213> Artificial Sequence

<220>
 <223> Synthetic Peptide

<220>
 <221> MOD_RES
 <222> (7)
 <223> Variable Amino Acid

<400> 59
 Asp Ser Ser Thr Ser Glu Xaa Gln Thr Thr Thr Lys Ala
 1 5 10

<210> 60
 <211> 20
 <212> PRT
 <213> Artificial Sequence

<220>
 <223> Synthetic Peptide

<400> 60
 Thr Thr Thr Lys Ala Ala Ser Ser Asn Val Val Ala Val Glu Phe Lys
 1 5 10 15

Thr Tyr Leu Asn
 20

<210> 61
 <211> 30
 <212> PRT
 <213> Artificial Sequence

<220>
 <223> Synthetic Peptide

<400> 61
 Ala Gln Ser Leu Ser Phe Phe Ser Phe Thr Lys Phe Asp Pro Asn Gln
 1 5 10 15

Glu Asp Leu Ile Phe Gln His Ala Thr Ser Thr Asn Asn Val
 20 25 30